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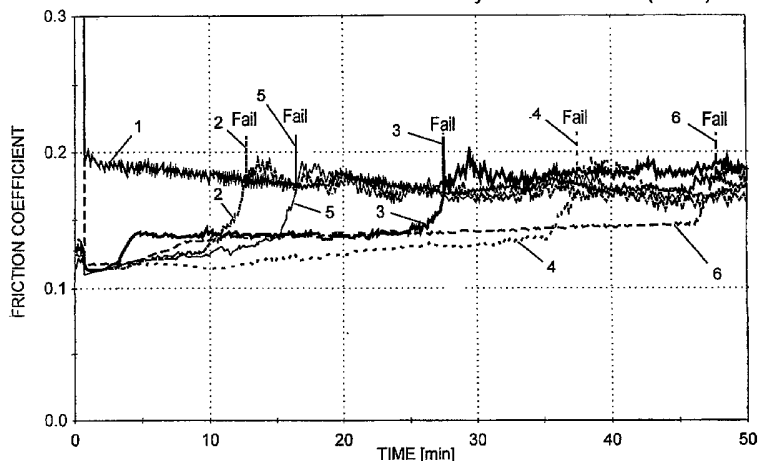
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(54) Title: SYNERGISTIC ORGANOBORATE COMPOSITIONS AND LUBRICATING COMPOSITIONS CONTAINING SAME

Evaluation of Friction Reducers by ASTM D5707 (SRV)



- 222 1) Napthenic Base Oil
- 264 2) #1 + Molyvan 855 @ 1 m%
- 265 3) #1 + OCD-289 @ 1 m%
- 266 4) #1 + Molyvan 855 @ 0.5 and OCD-289 @ 0.5 m%
- 267 5) #1 + Molyvan 855 @ 0.75 and OCD-289 @ 0.25 m%
- 268 6) #1 + Molyvan 855 @ 0.25 and OCD-289 @ 0.75 m%

ASTM D5707 SRV: 200N; 50Hz; 80C; 1.0mm stroke; 50 minutes; ball on disk

(57) Abstract: An additive for imparting antiwear properties to a lubricant composition is based on a combination of (1) an organoborate ester composition and (2) one or more sulfur-or phosphorus-containing compounds or a non-sulfur molybdenum compound. The sulfur-or phosphorus-containing compounds are dithiocarbamate, bisdithiocarbamate, 1,3,4-diathiazole, phosphorodithioate, phosphorodithioate esters, and the molybdenum compound is prepared by reacting (a) about 1.0 mole of fatty oil having 12 or more atoms (b), about 1.0 to 2.5 moles diethanolamine and (c) a molybdenum source.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/31725

<p>A. CLASSIFICATION OF SUBJECT MATTER IPC(7) : C10M 141/12 US CL : 508/194, 195, 198, 273, 274, 363, 371, 379, 430, 436, 444 According to International Patent Classification (IPC) or to both national classification and IPC</p>																																
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols) U.S. : 508/194, 195, 198, 273, 274, 363, 371, 379, 430, 436, 444</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched NONE</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EAST search terms: borate ester, thiadiazole, bisdithiocarbamate, lubricant</p>																																
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category *</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>US 4,389,322 A (HORODYSKY) 21 June 1983 (21.06.1983), column 1, lines 40-54, column 2, lines 1-48.</td> <td>1, 2, 16</td> </tr> <tr> <td>Y</td> <td>US 4,478,732 A (HORODYSKY et al) 23 October 1984 (23.10.1984), column 2, lines 7-30 and column 5, line 3 to column 6, line 3.</td> <td>1, 2, 16</td> </tr> <tr> <td>Y</td> <td>US 4,594,171 A (HORODYSKY et al) 10 June 1986 (10.06.1986), column 2, lines 10-34 and columns 5-6.</td> <td>1, 2, 16</td> </tr> <tr> <td>Y</td> <td>US 5,068,045 A (DONER et al) 26 November 1991 (26.11.1991), column 1, lines 14-62.</td> <td>1, 2, 16</td> </tr> <tr> <td>Y</td> <td>US 5,138,065 A (KAROL) 11 August 1992 (11.08.1992), column 1, line 47 to column 3, line 30.</td> <td>1, 14-16</td> </tr> <tr> <td>Y, E</td> <td>US 6,806,241 A (KAROL et al) 19 October 2004 (19.10.2004), column 2, line 20 to column 6, line 49.</td> <td>1-17</td> </tr> <tr> <td>A</td> <td>US 5,543,081 (ISHIDA et al) 06 August 1996 (06.08.1996), column 1, line 6 to column 2, line 61.</td> <td>1, 2, 16</td> </tr> <tr> <td>A</td> <td>US 5,354,484 A (SCHWIND et al) 11 October 1994 (11.10.1994), see the claims.</td> <td>1-17</td> </tr> <tr> <td>A</td> <td>US 4,889,647 A (ROWAN et al) 26 December 1989 (26.12.1989), column 1, line 55 to column 2, line 7.</td> <td>1-17</td> </tr> </tbody> </table>			Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	US 4,389,322 A (HORODYSKY) 21 June 1983 (21.06.1983), column 1, lines 40-54, column 2, lines 1-48.	1, 2, 16	Y	US 4,478,732 A (HORODYSKY et al) 23 October 1984 (23.10.1984), column 2, lines 7-30 and column 5, line 3 to column 6, line 3.	1, 2, 16	Y	US 4,594,171 A (HORODYSKY et al) 10 June 1986 (10.06.1986), column 2, lines 10-34 and columns 5-6.	1, 2, 16	Y	US 5,068,045 A (DONER et al) 26 November 1991 (26.11.1991), column 1, lines 14-62.	1, 2, 16	Y	US 5,138,065 A (KAROL) 11 August 1992 (11.08.1992), column 1, line 47 to column 3, line 30.	1, 14-16	Y, E	US 6,806,241 A (KAROL et al) 19 October 2004 (19.10.2004), column 2, line 20 to column 6, line 49.	1-17	A	US 5,543,081 (ISHIDA et al) 06 August 1996 (06.08.1996), column 1, line 6 to column 2, line 61.	1, 2, 16	A	US 5,354,484 A (SCHWIND et al) 11 October 1994 (11.10.1994), see the claims.	1-17	A	US 4,889,647 A (ROWAN et al) 26 December 1989 (26.12.1989), column 1, line 55 to column 2, line 7.	1-17
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<p>Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230</p>		<p>Authorized officer Glenn Caldarola <i>[Signature]</i> Telephone No. (571) 272-1700</p>																														